

Woody: What I'm doing, basically, is trying to track down the names and dates of the devices, which we call video tools, which are non-commercial, which have been created with a particular need. And so I'm first trying to run down the dates. Is there any material that you have already described?

Dan: No.

Woody: Let's do that.

Dan: But it will be hard to get the dates right, we'll fumble. We can figure it out against the . . . maybe you'll help too. Lock it up with political events.

Woody: We may say . . . Is there anything earlier than the IP that you would consider as a video oriented tool? Or maybe audio oriented tool?

Dan: Well, in terms of like the technical direction of the IP is the analog sound synthesizer developed by Moog which established, made a tremendous step away from earlier work into this idea of the patch programmable modular synthesizer with patch programmable signal processor designed with the idea of being low cost sacrificing some quality things, but very much a compromise machine, but in that compromise giving individuals and small institutions real power with the machine. Instead of the hundred thousand dollar fancy stuff that the U of I was doing and other people were doing. So to me that's the origin of the concepts that are involved in the IP.

Woody: Why is visual? What was the particular direction, video?

Dan: In terms of my personal thing, I was into . . . what I wanted to do before I was into video was . . . I worked in false color still photography. And when I tried to move into motion, film, everything became so cumbersome I couldn't go forward, like I'm too dumb. The way I say it is, I couldn't get the feedback fast enough to know what it was I wanted to do, even, and not only do it. And I couldn't play enough to find the special places that I wanted to work in as I could in still photography, play and find the place and work in it. And it occurred to me an electronic processor, of TV, could do similar things that I did chemically, primarily, and by funny exposures and sometimes optically with still photography.

Woody: So you actually thought about the moving image. That's basically what you wanted to do.

Dan: That was the motivation for it, was the idea of wanting to play with moving images and the processes that I was using in still images were too cumbersome to take into film, because turn around times were even worse, more expensive. I tried doing some stuff in Super-8 with my own processing. I just came to a halt.

Woody: In what situations were you at that time? What year was this, before the decision was made or when you were contemplating this decision? Was this pre-'70 or post-'70?

Dan: Pre-'70 for sure. Let's see if we can tie it down. When I was 21, which would put it in '63, so OK '64 was when I graduated from Schimer and started to work at Wisconsin so it would be '66.

'66 was when the idea first occurred to me and I researched some of the circuits and thought about it and the mythical beginning is at a railroad station in Urbana, Ill. with Russell Dobson, who has never seen the IP by the way, he's camped out up near northern California, I'll have to show it to him. And we asked the question of what it would mean to do the visual equivalent of a Moog synthesizer. And that's the way (we) presented the question to ourselves. I'd missed a train and we had a few hours to kill so we sat in the station talking. And so I took each Moog synthesizer module, let's say a voltage controlled amplifier, well that could do fades and keys, right? A voltage controlled filter I said could control resolution. I really didn't know it was going to be more trouble than that. And I just went through all the Moog modules and said if you center their bandwidth to handle video and you did the right things with sync and everything, what would they do? And it would kind of catalog these visual effects. Well, the step from that to the analog IP was a very small one in concept. So after I'd done that . . . that idea rang around in my head, I didn't start it then. I did some research on circuits and had it pretty firmly in my head but I didn't pursue it largely because I was still . . . you know video cameras and video tape recorders weren't in my environment, they were not very prevalent yet at all and it didn't occur to me that one could afford these things. And the idea of doing it in TV studios didn't make any sense to me. So I went out with other directions, computer generated stuff and environmental stuff with computers but not with video. But that idea was way back then . . . it just sat around for nearly four years I think, before I picked it up.

Woody: What were you doing during that time? Were you teaching?

Dan: Not yet. I got my MA in two years and decided that ultimately . . . got my 1-Y, in '66, and decided that . . . a friend of mine decided to do light shows and he invited me to join his light show company called Lighting Systems Design, and do light shows. And so, that's how I got kind of hooked into visual images more. I'd been working in photography then, but that's what really got me hooked into . . .

Woody: Did you make a living from photography?

Dan: During the Light Show Company I was paid a subsistence wage by the company and had enough tools to work with and I came out rather well as far as the company is concerned. I was fed, I had no money when I left . . . when the company collapsed I had no money in my pocket. I had to borrow some money and go . . .

Woody: Was that attached to Rock and Roll performances? Did you travel?

Dan: Yeah, well that was the goal. We worked a lot with recorded stuff and just taking over a little room and doing what would be a disco scene I guess, but very much psychedelic and lots of slide projectors and some special optical projectors.

Woody: Did you do any electronic work at that time?

Dan: No, it was still optics. Now Dick Ainsworth did some electronic control for the slide projectors and stuff and other stuff like that. But at that time I didn't do any electronic design. So I had the idea long before I knew any technology to implement it, except I researched it to know it

could be implemented. I got the Moog synthesizer plans and looked at them, understood how the circuits worked, kind of . . . I could understand it but I couldn't design it, I didn't have the tools of design. So that idea just sat around until the Cambodian crisis, which was '69, wasn't it?

Woody: '68.

Dan: '68, OK. The fall of the Cambodian crisis I came to; the Cambodian crisis was in the spring. I'd just come to Circle to teach, but not video. I'd thought I'd be teaching photography. The fall of '69 was when I came to the University of Illinois to teach in the Art Department.

Woody: You were invited or did you apply?

Dan: I sent 200 letters all over the country, all over the world for that matter, saying I'm a physicist and I do art, and I showed mostly color print stuff and I'd gotten show in the Sao Paulo Biennale that was based on computer stuff. And so I had a very spotty but, couple of glimmers in my exhibition record, most of it local stuff. Done at Wisconsin. And I sent letters out saying I'm a physicist and I do this kind of art and if you would I like me to teach that, ask me.

Woody: You sent it to Art Departments?

Dan: Art Departments all over the world, literally. 200 letters.

Woody: At that time you (**indistinct but sounds like ??**) you had decided something to teach?

Dan: Well what had happened was that I'd just . . . At that time, after I'd come back from doing the Light Show Company, after it failed, I'd worked as a researcher at the Physics Department at Wisconsin. I was kind of night manager of their particle accelerator. Nice job. Very challenging when you were there but definitely one that you could put away when you went away. It was great sport running this magnificent technological device and lining it up and aiming it and making sure it worked right so the experimenters were getting the right data and that kind of stuff. Very pleasurable job. Four days on, Four days off. Real half-time. Worked out very pleasantly. Gave me four day blocks to do my own photographic work. What happened was that I was just less and less time thinking about physics and more and more time thinking about images.

Woody: Now you applied for these jobs, what kind of curriculum did you have in your head? You must have been prepared for this teaching job.

Dan: No. I had graduated from an undergraduate institution with a very thorough curriculum. And I had assumed I would go there and there would be a curriculum. And I'm a bright person, I plug in. I'd learn that it was I had to learn and start teaching. That was my feeling, of course that wasn't the case at all. It was very disorganized, they didn't know what they wanted to do. They let me have kind of a free hand, and I taught kinetic sculpture, using motors and gears and pulleys and electronic stuff and light sculpture. I went to a school that is in the tradition of the Bauhaus and it had a couple of quarter courses that dealt with light objects, basically. I thought I'd be teaching photography, but the photographers there, I'm not quite sure what it was, but anyway the kind of

stuff I did wasn't . . . I worked in funny color prints and I wasn't . . . they weren't interested in having me teach the courses.

Woody: Once you said they had a suspicion they knew what they were hiring. As you say now, it was a Bauhaus tradition school.

Dan: Part of what was going on there was that they . . . remember that one of the things that the Bauhaus trip did was to kind of apply industrial technology—and the one very superficial part of it was to apply industrial technology, especially in their foundation program, a kind of break with traditional art stuff along with the social Communist socialist kind of ideas of designing stuff for the people and all of that. I think the people running what was now the descendent of the Chicago Bauhaus, which was at Circle, a kind of second generation Bauhaus was at Circle. They had the idea that similar kind of games could be made by transferring to electronic technology, computers or cybernetic technology. And they expected me to integrate that kind of stuff into their existing core program. I tried but was not successful. So I just kind of started out cutting out my own turf. In the fall of '69 when the Cambodia crisis, I hadn't met video yet, but I worked computer stuff and photography, environmental stuff . . .

Woody: How far did you go in your computer stuff, anyway? Was it imaging or just computer programming?

Dan: Computer controlled environments.

Woody: Mechanical sculptures?

Dan: Some of them were mechanical but a lot of them had to do with light and sound. It's kind of like, out of the light show tradition, certainly, but computerized and . . . We did Glow-Flow which went to the Sao Paulo Biennale, which was four transparent tubes which went around the room that were clustered at the corners, diverged in 7¼ degrees to the center of the clusters at the corners again. And these were tubes built with a fluid into which was pumped a phosphor. And then there were columns around the room that had speakers and light bulbs to charge the phosphors. It could start these blips of glowing phosphors traveling around the room in a pattern along with sound (synchronization). We had pressure pads in the room that took statistics on the arrangement of people in the room and modified the program based on . . . we tried simple algorithms to control the stuff.

Woody: How many of you were working? **(actually indistinct)**

Dan; There were about 10 of us, 10 or 12 of us.

Woody: What was it named again?

Dan: Well the name of the piece was Glow Flow and its simplification which was in the Sao Paulo Biennale was called . . .

Woody: What year? That was '69?

Dan: No, it was earlier than that, '68. But actually it didn't go there. It was scheduled to go there, but then there were these Strikes by American artists because of suppression. No American artists entered, so they took the Sao Paulo show and set it up at MIT. And so it actually was set up at MIT. But we were invited to the Sao Paulo Biennale.

Woody: What part was yours?

Dan: I was systems integration. I kind of made the whole thing work. And I worked with Gerry Earthman (?) who was really the idea behind it, the visual idea behind it. We lived together and we jammed a lot, so it was a lot of synthesis of our own thinking but he definitely had a command, he had an image of things he wanted to do, but I just had an image of things that could be done. It's different.

Woody: This was where?

Dan: It was at Wisconsin, Madison and I should check the date on this, but it would probably be around '66 or '67.

Woody: I missed what you did, this you did full time?

Dan: Now this was while I was the operator of the particle accelerator that gave me four days on, four days off. It gave me quite a bit of time.

Woody: But this is like the first scale project that you . . .

Dan: Right. That's the first one. And it was a failure on a lot of levels, but it excited people. There were waiting lines that would start six hours before the performance opened. It ran for two weeks. And so it was a success at that point of view, although half the equipment didn't work half of the time. It was a tremendous Herculean effort to keep the tech together to make it work.

Woody: From now we could go . . . What was your first position?

Dan: I taught in Sculpture because they were open enough to accept whatever I did.

Woody: It's a mechanical sculpture?

Dan: I tried. I never was very successful at it. I tried a couple of magnetic _____ to make fountains of iron and aluminum filings or stuff. I had some images but I never got any of them quite to work. But I'd done environmental stuff and light shows so I taught these kinds of courses in light documents using multimedia devices, slide shows. A course about light. It was the Cambodian crisis; the school was shut now. The art faculty, because they trusted their students and worked with them kept the art department open against the general trend although we diffused a lot of . . . concentrated all the activity in the art building. We were kind of a media center for a lot of movement stuff. We did posters, graphic art, utilitarian stuffy for the great movement. Well one of the problems with that was that there were all these instantaneous courses and stuff and it was a

real problem letting people know where they were. So someone suggested the idea of setting up a string of video monitors with a camera and a roller kind of thing just like a titler only mechanical variety typewriter roller paper business to announce these meetings and have them run continuously so someone could run in and it would be up in a few minutes. My collective was meeting at, you know the graphics collective was meeting at blank . . . But we set this up and in the process, borrowed some cheap Sony equipment, no tape recorder, just a single camera with a RF modulator strung to 6 RF monitors up the column where the elevator was which went to all the lounges, one to each floor. I became fascinated with the image. And then we televised some meetings. When the meeting was really crowded we put a camera and a mike in there, just broadcast, cablecast. And I just became fascinated with the image on the screen, and I would sit by the screen and stroke it, there was just something about the image that just got me. And then, and my first video piece was actually done there, I couldn't resist. One morning I got a nude model to sit over in a corner and I set up a camera so that it would view people walking by the model but the model wasn't in the camera's view. So you had all these people walking by doing double-takes. Then they would go up and sit down in the lobby lounge and watch other people do double-takes. That was my first video piece.

Woody: Could I ask you if that part, that particular period, which you mentioned . . .

Dan: '68, the crisis, the Kent State thing . . .

Woody: Did you enter into any political activity?

Dan: Yeah, I'd been pretty political, I'd been in jail and stuff. I'd been pretty political at Wisconsin.

Woody: That would be mostly war in Vietnam.

Dan: The anti-war movement. And Kent State is what had caused the crisis. That was a hundred miles away. And a lot of schools shut down all around the country because of that. It's an obvious rallying point, they'd shot three of us.

Woody: Because, that's interesting because I'm finding all over that video technologists were (inaudible) radicals. If you take Lee Felsenstein, he was an activist.

Dan: Right, and Bill Etra.

Woody: That's true, I'm finding that more and more.

Dan: At the end of that I took off on my long motorcycle tour which was twenty thousand miles around the country in four months. I circumnavigated the country. While I was taking that motorcycle tour it became very clear to me about the goals I had tried to achieve in still photography and failed in film could be achieved in video with a sophisticated video device. I'd already thought about the idea of the Image Processor very close to the way it finally came out. At that point I started taking apart the concept, considering all sorts of alternative organizational structures, pin programming, all sorts of other possibilities. After I researched the thing in my head it came pretty much to this thing. So now it's a year later, the fall after the Kent State thing and I

apply for a grant in Innovations in Undergraduate Education to do the Image Processor with the idea of using it to teach visual stuff. And I got that grant.

Woody: You also had proposed it into your curriculum?

Dan: Yes, same time.

Woody: (Inaudible) if you would read the course description at that time, would it already contain the (inaudible)?

Dan: I wrote the course description as soon as I got the machine up. But I proposed to put it somewhere.

Woody: completely inaudible.

Dan: yeah, there were some early polemics. I have a document called a Macro-proto proposal in which I proposed several ideas to investigate, one of which is the analog IP. About a forty page document, I'd be happy to send you a copy.

Woody: That's exactly what . . .

Dan: Which gives me the ideas I was thinking about at the time I designed the IP. I thought I was going to knock out the IP in a couple of months. So then ... so I got the grant and proceeded . . . that fall I started to teach myself electronic design.

Woody: That means you hadn't really done except audio circuits, maybe not even in audio, just nothing.

Dan: I'd been a radio amateur when I'd been a kid, so I had an affinity with it, but I certainly didn't know how to design circuits. I could certainly copy things out of Popular Electronics. I was comfortable with it but I didn't have any design, I didn't know enough. So during that nine months I taught myself electronic design by getting protoboards and building circuits and experimenting with video circuits and did some video stuff and did . . . before the IP was started, I did an event in an inflatable structure with Laura (Volkernine??). Where I just did some simple closed circuit video in a big inflatable structure, 80 feet long stuck out onto the Lake. And then during the evening I rented a black and white projector and did feedback with the projector, and a little electronic circuit to beef it up to work and people would walk . . . it was set up so people, when they would walk in, they would walk in front of the screen and cause the thing to swirl around and stuff.

Woody: It was very integrated, yes?

Dan: It worked pretty well. That was actually at the end of the summer. I'd started the IP. The IP wasn't finished yet.

Woody: Anyway, you'd worked with video already, closed circuit . . . you were also doing things like feedback? But the IP was a specific direction you wanted to take?

Dan: Yes, I was already doing it. The IP wasn't finished yet, but I'd built a couple of special purpose circuits partially to educate myself, in the things the IP could do.

Woody: What were the circumstances surrounding the IP? Did you have any communication with anybody or did you just (inaudible)?

Dan: The summer, in the spring just before I started the IP. This was one year later than the Cambodian thing. I went to New York and I knew there were video synthesizers, I had heard that and I went to go find out what they did. And the only video synthesizer I could see was Eric Siegel's thing. It was in the gallery of what is now Electronic Arts Intermix.

Woody: Howard Wise Gallery.

Dan: Somebody was there but not Howard Wise nor Eric Siegel. He showed me the machine and showed me some tapes and I had heard about the Paik/Abe machine, had an idea how it worked. Called up Global Village . . . I had a lot of trouble seeing people. I was very naive, I was from the Mid-West and I had dropped into New York, sitting in a phone booth calling people up to go see them. To find out . . . what I wanted to find out was whether the idea I had had been done yet and I should pursue another idea. What I discovered was there were people doing interesting things in the area. This kind of reinforced the direction. Nobody was doing a generalized patch-programmable or anything like it. In fact, . . . I don't know what state the Rutt/Etra was at that point.

Woody: There was no Rutt/Etra. Etra did (inaudible).

Dan: So then I came back and started to build it. It took me about a full year to build it before it was running even in black and white. I did some early stuff with Jim Weisman who had a copy of the Paik/Abe synthesizer . . . Steven Beck and Salvatore Martiano came to a concert in Chicago and the IP at that point was just getting underway.

Woody: What year was that?

Dan: We're still in the year of the IP, which would be the year after Kent State. Then I met Steven Beck who had been at the University of Illinois and had done this thing which was based on oscillators and relays and stuff and Salvatore had this early version of the Sal-Mar construction and was performing on it. Then that's when I met Phil Morton who was at the Art Institute and I saw him showing some tapes over in the corner. So I went and met him. After we finished all of that I told Phil I was interested in a video synthesizer and he was the only person that had responded like he was really interested. Everybody else would listen to me but they didn't understand what

I was talking about. And although they were supportive, he was the only person who had a goal that was close to it and said, "Well, include me as much as you can." So he was the person I got to show all the first modules to.

Woody: At that stage it was black and white?

Dan: Black and white. And then we got together with Jim Weisman. Phil and Jim and I got together and did some shows, the first one of which was the time, was the year the . . . we have a date on this too, I could send you the blurb on it. It was called "In Cons-creation of New Space" and it was the fall that the course was started with the IP and New Space was the name of the place where the course was. Before that I taught it out of my office. It was a video synthesis event consecrating a new video space at Circle, which was then real. And that was with Jim Weisman and the Paik/Abe synthesizer, black and white IP, a bunch of Super-8 loop projectors as input material and a lot of feedback. There were a couple of works in there that are still quite nice, I think.

Woody: Were the range of modules basically accomplished or rather modules that were not accomplished yet?

Dan: The amplitude classifier hadn't been accomplished yet and the color encoder hadn't been done yet. As a matter of fact the sync generator hadn't been done.

Woody: I see. You would say that those were the only additions, or did you add . . .

Dan: Well, when it got it's own color encoder it became a much different instrument. Paik/Abe is a beautiful colorizer but it's irrational. You can't say, I'm going to get up this kind of key situation and put red here, for instance. You can't drive it, you can only ride it, that's Nam June's story. So when the color encoder came to the IP you could really drive it in color and it made it a very different machine. And then the amplitude classifier and then refinements after that. Output mixer, audio input and some other stuff. So that's kind of the story of the beginning of that. Then, and then of course there's the story with Tom.

Woody: First of all, I would like to pursue this. From the original configuration, what people or what . . . how did it start to propagate or to multiply?

Dan: I had always the idea of giving it away and letting people copy it. But I had assumed it would require someone of considerable technical background to copy it. And Phil Morton asked me if he could copy the IP.

Woody: That was the same time? When was that?

Dan: Yes, that was right around "In Consecration of New Space." It was clear it was going to work and Phil wanted to copy it. And I didn't think they could, that he knew enough. So I gave him a-1 sorts of things. Go build a couple of Heathkits and come back and talk to me. And he said, "What should I build?" "Build a signal generator and an oscilloscope, you're going to need them anyway." So he built those and he came back and he was just very tenacious. He'd learned mechanics from this mechanic he worked for and stuff and he knew how to learn from people, that kind of stuff and I wasn't any good at teaching (that) and he seemed a good learner and I was a lousy teacher which made it work. And so he just started to do it and in the process developed the documentation. He's completely responsible for the documentation. I did a lot of the work, of course, I had to, but he's the one who would do anything he could to get me to do it. He would redo my drawings and write

things for me and criticize them and check my diagrams against his copy that worked and all that kind of stuff that made the documentation come together.

Woody: But I guess we have to come eventually to this decision of yours to treat this property as a common property.

Dan: That was in there right from the Macro-proto proposal, long before any building started, that was my own philosophy. To give it away and take this business about being paid by the state to develop and disseminate information very seriously.

Woody: You basically established _____ to yourself and became totally acceptable to you and in fact was your program, to disseminate these kind of systems to anybody interested.

Dan: Yes.

Woody: I see.

Dan: I kept having the idea that we could work it out so that if somebody made a lot of money I could get some of the money, but that hasn't happened.

Woody: That in a way makes you better than the rest of the guys, but from your viewpoint it might not have been considered what's better.

Dan: I'm paid by the state to do it. Economics allow me to do it. I didn't have to support myself with this development of mine so . . . I mean if my support system were different, my religion would be different.

Woody: I'm sure, but you would still be working for light shows, for money and you would decide probably very differently.

Dan: Right. So I was able to make that choice by virtue of the way I was employed.

Woody: But that decision in a way made you unique. Even if it was dictated by your normal state of mind it was unusual. Just in a numerical way, how many systems do you consider to be duplicated or finished?

Dan: Somewhere around 15, maybe more.

Woody: Anybody keeps track of it?

Dan: Most of the IPs . . . I've been in contact with most of the people who've built IPs. Most of the people who have started them . . . there's only been one started that didn't get finished. Most everybody has completed their IP or almost completed it. Certainly a functioning powerful instrument although it may not have all the modules.

Woody: (But) we can just get this numerical thing straight. Now, maybe before we go to DeFanti . . .

Dan: Which is another . . .

Woody: Which is another involvement and that in fact should be part of a different discussion. Even if I wanted to cover the digital tools, I don't think it's possible. The video has a sizable amount of subject.

Dan: Let's at least mention that that's a part that's being ignored.

Woody: What I wanted to know is this: the kind of images that emerged from this system, came from the IP, you must have cataloged them, at least in your head. Did you ever develop a curriculum, in which you would teach the techniques of modules? What was your idea about what it was?

Dan: My idea was just to explain the operating principles of the IP and demonstrate what the modules could do singly. Demonstrate some simple combinations to let them know what the playground was and that's it really. Then I'd just cover the rest of videotech and look at what people do. I really don't in general show people my standard patch that I've been using on the IP for years. They some times goad me into it and I do it, but I resist the idea. In my ideas you just teach the operating principles and people go their own way. The most joyous thing about it is the fact that students and other people too, who aren't formal students who have built the IP, really discover their new turf. They see images that I never could conceive of on the instrument.

Woody: So you didn't want to . . . (inaudible) just a few patches?

Dan: Well I demonstrated the principles, but always very simple. I never kind of laid out a goal.

Woody: In a way, that introduction to the IP that you recorded is about the standard procedure you . . .

Dan: Just longer. Just take a couple of hours doing it instead of 5 minutes.

Woody: So you never engaged in summarizing a language, verbal description of all the effects. That was never important?

Dan: That was damaging. Because then people would think that that's how you're supposed to use the instrument. And I tried to design it . . . what's unique about the analog IP among video synthesizers although other machines participate into it considerably, still most of the devices people use are quite specialized. And the IP was really conceived as being a very generalized instrument that could kind of do everything you wanted to do, that was the goal. And people would do things I couldn't think of. That's the definition of generality, that that device can do a lot of things. It can do whole classes of things the designer never intended it to do, in a sense. Its organizing principles are well below what it can do, it's much more primitive. And of course the Hearn colorizer and the Rutt/Etra device are very similar, less extensive in the case of that

colorizer. But I really expected a whole flood of patch programmable video synthesizers of a _____ domain because Moog's model was so clear and so correct that I expected them to crop up by the hundreds, and they haven't. There are works here that I did during this particular period. I have bunches of tape from it, some of which I still show. I have an original tape, by the way, which is the first tape I ever distributed. A five minute romp, some works by me and some works by my students, excerpts, a bunch of five minute excerpts of all the stuff that was done in the first year of the color IP. I made 20 of those and sent them to my friends all over the country, because they've been humoring me in this idea for several years.

Woody: Do you make any distinction between video and what's used with the computer? Is it specified or is it to you evolutionary so you don't have to make distinctions?

Dan: The IP is primarily an image processor, although it can do some image generation. Most of the computer stuff is image generation stuff, like Tom's system. So that's really how they sit in my head, primarily. Also, it turns out that with a good model that Moog developed you can make very usable machines by just paying attention to some of the details of how you design the modules and stuff. And the digital problem I think is much more severe. You know, really concentrated effort after many years of doing this stuff to begin to develop control structures that are fluid enough to be really controllable. Where the artist, where the producer didn't always have to have a lot of programmer between him and/or with him, whatever relationship they had . . . where the systems became sophisticated enough so that the person interested in the image could sit down and play with them and discover the places, develop them . . . That's really a very hard trick in the digital world.

Woody: You see very strong division between the programming of digital image generation and image processing?

Dan: Yes.

Woody: But as I recall you mentioned that you were surprised that people would _____ into your device which you conceived as image processor also an image generator.

Dan: People used it in ways I didn't think of, which of course is very gratifying. I still see it, every year or so somebody takes that instrument and creates an entity that, that was just not in my head at all as what it could do. Barbara Sykes has done that with the (masks?) or some of her earlier work, I'd never thought of that. Hugh Levenson was the first person to use oscillators that way that I saw at least with the IP. There were other people working in parallel, like Bill Etra was doing oscillator stuff by then.

Woody: Now would you comment briefly on the concept of the Habitat. What's the full name of it?

Dan: Circle Graphics Habitat which is now called the Electronic Visualization Laboratory or EVL.

Woody: What was that all about?

Dan: Let's see if we can get the dates straight. The IP was just coming up in color when Tom showed up on campus. He showed up on campus because of a farsighted man named Joe Lipson who was the Vice-Chancellor who was committed to the idea of getting powerful educational technology generated on campus. And Tom had a system GRASS, which was very applicable to the generation of educational materials. He also financed New Space, gave me enough money to buy tape recorders and stuff to surround the IP. You see the IP was constructed about half from this grant I mentioned and about half out of my own money. Basically the school ended up buying the test equipment and bunches of other stuff and I bought the parts. They paid my salary for a summer, which gave me more money so I could buy parts. He came and at that time I had been over at the Vector General which was already there. I'd been over there but the machine was largely not used. It's a very cumbersome FORTRAN based software . . .

Woody: Typical situation.

Dan: Very typical situation although there had been a person working there doing at great effort molecule simulations and other things in Chemistry. When Tom showed up there, the system basically wasn't working very well. Tom kind of visited there because he was very familiar with it. And in about a week, he made a tremendous improvement in the system and so they decided they should hire him to get this hundred and fifty thousand dollar largely unused device operational and Joe Lipson wanted him to come here to do educational technology stuff and so they hired him, and inside of 2 weeks, he had GRASS up and running on that machine and it was spectacular. And I'd been kind of hanging out there and Ted Nelso was there too. He'd been there now for a year and . . . you can learn a lot from him, he's really got incredible ideas. We'd planned to do some work together and I basically chickened out on him, because the stuff he planned struck me as very difficult to do and I wasn't sure I could do it, and I kind of backed out on him which has left us . . . although we're cordial . . . a rift. Right at that time, Tom came and got this system working. Ted worked on it and I worked on it and Tom actually . . . it's one of these high coincidences where he came to work and I was hanging around the system, but as an aside needed a place to stay for the summer and I was going away for most of the summer, motorcycling. So, he stayed at my place and we both had motorcycles and we both read comic books and our personal religions in terms of the designing of our machines were very similar. The technologies which we used were very different, but our goals were right the same and our design techniques were very similar.

Woody: How did Tom come to this humanistic concept of a co-puter? He didn't have to.

Dan: Yes, there are other options. Well, Chuck Csuri was interested in computer graphics for a long time, and Tom was Chuck's student. He also had a teacher's name; I don't remember in Information Engineering, . . . as an Indian, and very . . . I met him once, he was a very wonderful and gentle person and an extremely good computer person and there was really a lot of influence . . . Tom learned a lot from him.

Woody: Whose terminologies (inaudible) Habitat.

Dan: Tom's.

Woody: What led him to this _____ . _____ ?

Dan: Oh yes. Computer Graphics as a Way of Life which Ted Nelson . . . That laid out the religious . . . _____ religion.

Woody: What was the frequency of your interaction with Tom.

Dan: Well, he was at my house until he found his own place. And he immediately wanted to bring over the IP _____ the Vector General and colorize it. I actually didn't think it would be very interesting, but he kind of talked me into it and it was very successful right from the first time we did it. We had two half-inch color recorders and we do this little half-inch introduction, which I don't think has been seen very much, the very first stuff we did together, kids playing in the playground, smiling and jumping up and down and pushing buttons, sloppy stuff. And that slowly evolved, constantly working on technical fronts and going for images. Tom, for instance, was the person who made EVE-1 happen, he's the person who really wanted to do that. So I don't know what to say here. That thing with Tom and me and that whole direction is really another story and a very powerful one. But he's had, it's really kind of, like when he was at Ohio they made a distinction between technicians and artists so he couldn't do his personal art on the machine even though he was the only person in the place who had run a camera. Just because he's technically minded . . . But he'd always had the goal of making computers easy to use. I mean he intrinsically thought they could be easy to use, and he had the interactive model. His system had dials before it had variables, before it had the programming language it had dials controlling images on the screen. It really grew right up from interaction. It had interaction before it had anything else. So he was absolutely committed to the idea and he understood intuitively although I didn't know how well explicitly the idea that if you give people enough information, a rich enough feedback, they can do very complex things quite easily. Well if you make them specify it all out, like turn here, go there, move four blocks, turn up; it becomes very difficult. Just give them a goal and a rich enough feedback; they can get there. And it makes the job vastly easier and that's something that's still not grasped by a tremendous percentage of the people working in computer images and computer sound. So, we can keep talking about that, it's certainly important, it's certainly a real extension of the IP and I learned a tremendous amount from Tom. Part of it is just that he had similar goals in a different technology and he's a very generous person and very open with ideas.

Woody: How did you do it as a support system?

Dan: I was just teaching at Circle and Tom was teaching at Circle too.

(inaudible, including "This is Blake????")

Dan (con't): Well the Doctor of Arts program, which was this program which Joe Lipson got off the ground to train people to do high quality educational technology and it's a story all by itself. He's a story all by himself and, I think, has very profound ideas about the future of education and stuff. There was this Doctor of Arts grant which had money in it to build a copy of the IP for Tom and supported him for a couple of years without a . . . So there was money there to get Tom some released time to develop GRASS more. It was certainly a very functioning system when he came to Circle, vastly better than anything else, than I even think exists now. At that point, and he's evolved it beyond, just making it easier and easier and more powerful and confronting all sorts of real basic

problems like how to construct computer languages that don't require loops to be used explicitly, since they're a pain in the neck and stuff like that. And there's a paper called "Towards Loopless Interactive Programming" which discusses those issues. I think you have all the papers.

Woody: What I have to do now is basically just start to go back and look, because you have written about that period and about the concepts of the Circle Habitat you have written substantially.

Dan: Tom has. Ted Nelson, who I'm not mentioning enough in this whole thing was early around doing important stuff although the big problem that we had was that the projects that Ted wanted to take on always struck me as larger than what I could reasonably be expected, what one could reasonably do. I have a short nose on my head (??), but that's the way I am. I dream very close to what's doable right now. That's just the way I am. But at the idea level, Ted was very important.

Woody: Give me some sources. Whoever was closely associated with that period of the . . . of the first period of the IP, because I guess that's what we've covered.

Dan: Jim Weisman and Paul Challicoe (??) who came with Nam June Paik to visit the Art Institute. They were at Cal Arts and Nam June was there too and the Tude paid them to come visit and do a visiting artist's gig and the IP then was kind of up in black and white and I played it a little bit, so I brought it over at Jim's and Paul's (at) Nam June's urging. I brought it over and set it up, and it worked. I was using his device as a colorizer for it, in a sense. And we had a wonderful time playing. Jim and Phil and me and Paul Gallico and a couple of other people. It was a very pleasurable . . . And Drew Browning was a student and Gregory Dawe and Ed Rancus were all students then.

Woody: Are they traceable?

Dan: Well Ed Rancus is replacing me. He's the one who did that disco prior to disconnection. "Not of this Earth" it's called, and he's replacing me this year while I'm on my Guggenheim. And there were some students who were still working in video there who are doing very good things. Actually quite a few there, because I have 10 or 15 people that surrounded it almost immediately. I was teaching a course in it, it's very easy.

Woody: Have we forgotten anything? Because I know the control device is a whole separate chapter, like the glove and the others.

Dan: You know this is very late now and they were early. The Macro-proto proposal has a tremendous amount of that stuff in it. I just didn't realize that it was going to take me a decade to do it. I thought I'd do it in a couple of years.

Woody: What I have to get from you is this proposal, because that probably is the genesis of that particular period.

Dan: That actually discusses three or four different kinds of video synthesizers that I was planning to build, Fourier pattern generator, and all sorts of things I still think about building once in a while, but now the digital image processor is what I'm going to be up to for awhile.

Woody: We would also have to go through your work and pick up the significant phases, but that's a whole different bag. I think you're going to be back in Chicago over the winter?

Dan: In September I will be and I'll be there for a year.

Woody: I think Burris will visit you once to copy information and from Phil.

Dan: I think you should get the story according to Phil.

Woody: I've already found so many coincidences, like Hearn who saw the first colorizer of George Brown who probably saw the first colorizer of Eric Siegel and then you saw Eric Siegel's . . . it's an unbelievable chain.

Dan: Well there aren't too many people working in the area, really.

Woody: It has been in a way small community, in the beginning, going through maybe twenty, twenty-five people. And it eventually grew in the same period into a larger community of toolmakers. Of course, there are still very few that have accomplished, put it in the box, so to speak. Very interesting. Have I forgotten anything from that first period? Is there anything . . .

Dan: No, I'm not sure. Probably some of the writings . . . I'm sure there's people I've missed in there. Nam June was very . . . what he saw was the IP in black and white and he was very supportive. Of course he's wonderful.

Dan (con't): Which was supposed to be a week and a half long and we didn't have anything to play his color tapes on, we only had black and white equipment at the time. What he suggested was that he shorten his stay and free up \$1,000 of his fee to buy a color tape recorder so we could play his tapes. And that gave us our first color tape recorder which was a Shibaden EIAJ standard. And that gave us our first color recorder with this stuff which we used in "In Consecration of New Space" to record it all.

Woody: That was a new generation recorder or what?

Dan: Yeah, EIAJ. We never had a 5000. I didn't know of a single 5000 in Chicago. I'm sure the video dealers had them, but I don't know anybody that had one. They missed it entirely, being a little bit late.

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